KNOWLEDGE
AN ILLUSTRATED
MAGAZINE OF SCIENCE
PLAINLY WORDED—EXACTLY DESCRIBED

LONDON: FRIDAY, NOV. 30, 1883.

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A NATURALIST'S YEAR.

By GRANT ALLEN.

THE REIGN OF EVERGREENS.

THE poor stripped and draggled garden is beginning to look very bare now of all except a few straggling late-flowering shrubs and those trusty adopted friends that we have always with us, the shrubby, large-leaved southern evergreens. In northern climates, we must ruefully admit, there are hardly any true evergreens, save only the conifers, with their stiff and needle-like foliage, such as pines and spruce-firs; but we make up for it to some extent by borrowing from warmer or more southern lands the laurels, aucubas, laurustinuses, and rhododendrons that help to keep bright our English lawns and shrubberies throughout the long and weary winter months. Indeed, our only native flat-leaved shrubs that retain their full greenness from year's end to year's end are privet, box, and butcher's broom, all three of them very doubtfully indigenous to these islands. It is the rule with English trees and shrubs to shed their foliage every autumn; and the fashion in which they do so shows very clearly how purposive and well-adapted to their conditions in life is the deciduous habit. For the leaves do not merely tumble off anyhow, casually, before the first fierce autumnal wind; if they did so there would be loss of sap and of valuable food-stuffs to the whole plant of whose joint commonwealth they form the partially independent members: their fall is duly provided for beforehand, and when at last it actually takes place, it takes place in an orderly and regular fashion, with the least possible injury to the interests of the entire tree. From the very beginning there has been arranged at the joint where the leaf-stalk joins the stem, or where the separate leaflets join the central mid-rib, a row or articulation composed of cellular tissue, and specially designed to act as a joint for the dry leaves. When winter approaches, and chilly northern storms are likely to tear to pieces the leaves on the trees, all the protoplasm and other valuable cell-contents are withdrawn into the permanent tissues of the plant, leaving only the minor red and yellow colouring matters—mostly effete and used-up foodstuffs—which give so much beauty and glory to the general aspect of our autumn woodlands. Then the articulation dries up and withers, and the dead leaf separates at the joint, leaving behind it a regular mark or scar, which is the visible token of Nature's definite precaution against the northern cold and tempests.

It was not always so, however, and it is not so even now in the greater part of the modern world that we ourselves inhabit. It seems quite natural to us northerners that "leaves have their time to fall"; so natural, indeed, that we almost forget the strict limitation of the practice to our own chillier latitudes. Yet in reality the existence of deciduous trees is a mere temporary accident of the here and the now, a passing consequence of the great cold spell which had its culminating point in the last glacial epoch, and from whose lasting effects we ourselves are even still apparently suffering. Whether, as Mr. Alfred Russell Wallace seems hopeful enough to believe, our poor old planet may yet recover from this premonitory chilling or not—whether we may yet look forward to a few more warm spells or otherwise, before the final numbness of all dying worlds comes upon us, is a question rather for the consideration of astronomers and physicists than of the mere mundane-roving naturalist, with his petty ephemeral interests in our own plants and animals; but one thing at least is certain, that till a very recent period, geologically speaking, our earth enjoyed a warm and genial climate up to the actual poles themselves, and that all its vegetation was everywhere evergreen, of much the same type as that which now prevails in the modern tropics. Indeed, we have only to look at the existing state of things in order to see how very slight is the effect that has thus been produced upon our temperate flora. For example, among the oaks alone, there are some twenty species in Europe, of which southern Europe has eighteen, mostly evergreen, while north of the Alps there are only two, or at most three, all of them deciduous. From the evolutionary point of view it is clear that the northern kinds are modern developments, specialised to contend with the peculiarly cold conditions of sub-arctic Europe.

Fortunately, too, we are not left in this matter to mere conjecture or analogy: thanks to the researches of Heer and others, we have positive geological facts to guide us, which show conclusively that up to the Miocene period, Europe was covered by forests of large-leaved evergreen trees, of what we should now consider distinctively tropical types. Ever since the Miocene, and on to the culminating point of the great Ice Age, the European climate has been growing steadily colder, and the European flora has been at the same time steadily adapting itself to the new conditions, and to assuming what we now consider a typically northern aspect. During all that time, the large-leaved evergreens gave way before the deciduous trees and the chillier conifers, beginning at the north pole, and spreading gradually southward, as the cold deepened and widened its range. Since the end of the great Ice Age, and the subsequent slight amelioration of the climate in northern Europe, a reverse process has begun to set in; the arctic types have begun to recede slightly once more, and the comparatively southern or temperate types have pushed their way northward to occupy the place from which they were previously dispossessed by the newly-evolved kinds. It is not necessary for us here to inquire into the causes of this great cycle; the facts are there, and for our present purpose they are quite sufficient. They show conclusively, when one follows them out in detail, that the evolution of deciduous trees was concomitant with the growth of cold conditions around the two poles; and that such trees now exist only where winter extends for part of the year, rendering the evergreen condition an undesirable one. Even in the tropics, indeed, we find on high mountains a belt of

deciduous forest, stretching above the belt of large-leaved evergreens, which itself succeeds to the lowland palms and bananas and tree-ferns of the thoroughgoing equatorial plains.

The reason for the evolution of deciduous trees is of course to be found in the peculiar circumstances of the circumpolar regions. In the tropics, trees and plants can thrive and blossom all the year round; and even in temperate countries most small herbs and weeds gain by keeping their foliage throughout the winter; but big trees in cold climates would suffer much by the tearing and strewing of their leaves in winter gales, while they would obtain little advantage by retaining them on the tree during the long chilly season. Hence, if any tree happened to possess any arrangement by which dead or dying leaves could be removed without injury to the permanent tissues, while, at the same time, the useful materials were withdrawn into the young bark to await the spring awakening, such a tree would obviously enjoy an advantage in the struggle for existence, and would be likely to outstrip its evergreen neighbours in rigorous climates. Now, as a matter of fact, the germ of such an arrangement is found even in many herbs or small shrubs, such as, for example, the common pelargoniums or "scarlet geraniums" of our flower-gardens. Everybody who has ever kept these familiar plants in his own rooms must have noticed how easily the dead leaves separate from the stem at their base, by means of the swollen cellular mass where the leaf-stalk joins the axis. All that the forest trees of northern climates had to do, then, was just to take advantage of this nascent provision, wherever it existed (mark this prior necessity), and render it more fixed under the influence of natural selection. But, if we may judge by the actual sequel, it was not every kind of tree that could thus adapt itself to the altered circumstances; as a matter of fact, the number of species among northern forest-trees is very small indeed, and even out of this small number a good many are conifers, like the pines and yews, whose narrow, tough leaves are well fitted for withstanding and battling against all the wintry breezes. Still, among the conifers themselves there are a few species, such as the larches, with tender delicate foliage, which have also become deciduous under stress of altered conditions. At the present day the large-leaved and flat-leaved evergreens are mostly confined to tropical, sub-tropical, or at least warm temperate climates, and all the forest trees or the circumpolar tracts are either deciduous, or else are tough, leathery-leaved conifers. The laurels and rhododendrons, with which we strive artificially to brighten up our comparatively leafless English winter, are either hardy representatives of the warm temperate flora, or else mountain species from southern climates, with constitutions just strong enough to endure our chilly season in favoured and carefully selected situations. Such evergreens have generally very rigid and slimy leaves to protect them—a point well marked in ivy and laurel as compared with Virginia creeper and English hawthorn.

THE ZONE OF SMALL PLANETS.

By Richard A. Proctor.

MY attention has been called to the circumstance that the theory of a shattered planet has been entertained of late by the most eminent philosopher of our age,—who, though not professedly an astronomer, has shown astronomers in other matters the way to reason correctly about the facts which they have laboriously collected. I was aware of this, but have had a reason for not dwelling on the point. Indeed it was the circumstance that the theory has seemed worthy of discussion by so clear-sighted a reasoner which induced me to reconsider it.

The reason which has chiefly directed attention of late to the explosion theory has been that the wide extension of the zone of asteroids seems inconsistent with the nebular hypothesis as advanced originally by Laplace. It has appeared to the powerful reasoner who has lately advocated the explosion theory, that, now the ring has been found to contain so many members, strewn at such widely different distances, the theory that they are portions of a nebulous ring which separated into several parts instead of collapsing into a single mass seems no longer tenable. Again "did a nebulous ring break up into numerous small portions, revolving round the Sun with approximately equal velocities, the annular series of them would inevitably have some point of least attraction between its adjacent members at which parting would take place, followed by collapse of its members upon one another till a single body was formed. Moreover, their mean distances from the Sun could scarcely differ so much that some are twice others: it could hardly happen the the annular space included between their most unlike mean distances would be more than 100 millions of miles across, and that the space occupied by the widest excursions would be 270 millions of miles across. Again the parts of such a ring could not well have orbits much inclined to one another, or much inclined to the average plane of the solar system as are sundry of the planetoid orbits. Further their orbits could not differ greatly in eccentricity as they do, one if not more of them to the extent of cutting the orbit of Mars. Surely no portion of an outer nebulous ring could thus intrude upon the region of an inner nebulous ring, at the same time that other portions almost intruded upon the region of a remoter nebulous ring. Once more, there could not arise any considerable difference between the times in which the discrete portions of such a ring revolved around the sun; to the extent of some being thrice others." All these traits of the planetoids, as Mr. Herbert Spencer truly says, are inconsistent with the supposition of Laplace as to the origin of the zone of asteroids.

The above reasoning is so thoroughly sound and convincing that I have ventured to quote it despite even the strong reason (based on Mr. Spencer's wishes) which I had had for treating this subject without any direct reference to his masterly essay on the Nebular Hypothesis. Indeed those who are astronomers by profession,—or at least surveyors of starfields—take so little interest in questions of this sort, that in dealing with them one must turn, of necessity, to the thoughts of men like Kant, Mitchel, Wright of Durham, Herbert Spencer, and others, who do not find in mere observatory routine the full value of what the heavens teach.

If, as I think is demonstrable, Olbers's explosion theory is absolutely inconsistent with the observed paths of the asteroids and with known physical laws, and if, as I think has been demonstrated above, the movements of the asteroids are inconsistent with the theory that they were formed by the breaking up of one of the rings of Laplace's nebular hypothesis, it would seem to follow that that hypothesis is either incorrect or incomplete. It has been so long my own belief (and the belief of many other students of the matter) that this is so, that I find nothing surprising in the recognition of other and perhaps clearer evidence of the fact than had before been obtained.

What, I would ask, is known about the laws of cohesion, of vaporous diffusion, of the interaction of the parts

of vaporous masses, which corresponds with Laplace's nebular hypothesis as originally advanced,—when as yet our knowledge of the physics of the subject was but in its infancy? Again, under what possible conditions and in what periods of time short of infinity, would the vaporous masses strewn around such a ring as that from which Neptune on this theory was formed, have coalesced into a single mass? Then, what account does the theory give of the meteoric and cometic matter which, we now *know*, must have been strewn amid the whole region in which Laplace set the vaporous embryon of the solar system, in quantity corresponding to no small aliquot portion of the mass of the planetary system? And lastly, what account does the nebular hypothesis as originally propounded give of the singular distribution of the masses which form the solar system?

Seeing that the theory of meteoric aggregation, duly combined with (but not subordinated to) the theory of vapourous condensation, accords not only with all the known facts but gives an account of all those chief peculiarities of the solar system with which the nebular hypothesis (alone) is actually inconsistent, it is with *this* theory that the characteristics of the zone of minor planets should be compared. I think I shall be able to show that, when this is done, instead of discord and difficulty we find clear and convincing evidence respecting the evolution of the solar system, and also information as to the way in which that process was brought about.

(*To be continued.*)

SEA ANEMONES

AT THE RECENT FISHERIES EXHIBITION.

By Thomas Kimber.

IX.—THE DAHLIA.

(*Continued from page* 306.)

THIS is a chapter on gastronomy, showing the best-known methods—unknown probably to Professor Buckmaster and the Kensington School of Cookery—of cooking Crassicornis. The following recipes are taken *verbatim*, with the kind permission of the author, from "A Naturalist's Rambles on the Devonshire Coast," by P. H. Gosse, F.R.S. The testimony of Abbé Dicquemare, referred to by Mr. Gosse, of the excellency of boiled Crassicornis we gave in our last communication on page 306.

"And now for a paragraph on cookery.

"Dicquemare's testimony to the excellence of *actinia crassicornis* for the table tempted me to taste it, and I determined to take an early opportunity of cooking a few. In a few minutes I collected some half-a-dozen of different sizes at low water near Wildersmouth, and having rubbed them with my fingers in a tidepool till the coating of gravel was pretty well got rid of, brought them home. I put them into a pan of sea-water for the night to cleanse them, and most beautiful and gorgeous was the appearance they presented when expanded—no two alike in colours, and yet all so lovely that it was difficult to say which excelled. Perhaps one with the tentacles partly cream-colour and partly white was as beautiful as any.

"The next morning, however, I began operations. As it was an experiment, I did not choose to commit my pet morsels to the servants, but took the saucepan into my own hand. As I had no information as to how long they required boiling, I had to find it out for myself. Some I put into the water (sea-water) cold, and allowed to boil gradually. As soon as the water boiled, I tried one; it was tough—evidently undone. The next I took out after three minutes' boiling. This was better; and one at five minutes was better still, but not so good as one which had boiled ten. I then put the remaining ones into the boiling water, and let them remain over the fire boiling fast for ten minutes, and these were best of all, being more tender, as well as being of a more inviting appearance.

"I must confess that the first bit I essayed caused a sort of lumpy feeling in my throat, as if a sentinel there guarded the way, and said, 'It shan't come here.' This sensation, however, I felt to be unworthy of a philosopher, for there was nothing really repugnant in the taste. As soon as I had got one that seemed well cooked, I invited Mrs. G. to share the feast. She courageously attacked the morsel, but I am compelled to confess it would not pass the vestibule—the sentinel was too many for her. My little boy, however, voted that 'tinny was good,' and that 'he liked tinny,' and loudly demanded more, like another Oliver Twist. As for me, I proved the truth of the adage, *Ce n'est que le premier pas qui coûte;* for my sentinel was cowed after the first defeat. I left little in the dish.

"In truth, the flavour and taste are agreeable—somewhat like those of the soft parts of crab. I ate them hot, with the usual crab-condiments of salt, pepper, mustard, and vinegar, mixed into a sauce. The internal parts, including the ovaries and the tentacles, though, from their mottled appearance, rather repelling to the eye, were the most agreeable in taste; the integuments somewhat reminded me of the jelly-like skin of a calf's head. I wonder they are not commonly brought to table, for they are easily procured, and are certainly far superior to cockles, periwinkles, and mussels. After a very little use, I am persuaded anyone would get very fond of boiled Actinias.

"Some I had left, with a little gravel still adhering, in order to see whether this would be thrown off when life departed; but it was not so. They should be cleansed before cooking, which can be easily and quickly done with the fingers under water; the base also should be scraped, so as to remove any bits of slate, or rock, or dirt that adhere to it. Attention to these particulars greatly improves the appearance when cooked. They are of a pellucid rosy hue, of a firm consistence; at least sufficiently firm to be readily cut with a knife.

"The next that I tried were prepared in a different manner, and, truth to say, the experiment was far more successful this time. I cleansed them more perfectly, carefully scraping the bases until they were freed from every particle of extraneous matter and from slime. These I had fried in egg and bread-crumbs, and they were far superior to even the best on the former occasion.

"All prejudice yielded to their inviting odour and appearance, and the whole table joined in the repast with indubitable gusto. I know not if my readers are familiar with a dish which in Newfoundland during the cod-fishing season we used to consider worthy of an epicure—the tongues of the cod taken out as soon as the fish are brought on shore, and fried immediately. The Actiniæ fried, as above described, I should scarcely be able to distinguish, either by the eye or by the taste, from fresh cod's tongues, except, perhaps, that my *protégés* are slightly firmer in consistence.

"*Anthea cereus* I subsequently tried prepared in the manner last mentioned. They, too, were savoury; but the sliminess of their tentacles was somewhat disagreeable. They are far less substantial, in proportion to their apparent size, than the Actiniæ—little, indeed, remaining, but a mass of tentacles. When Johnston speaks of the

'hot and peppery *Anthea*' I presume he glances at its urticating properties, for there is no pungency in its taste."

Dr. Johnston ("History of Brit. Zoophytes," vol. i. p. 236) asserts that sea anemones are so very sensible to atmospheric changes that they foretell the weather as certainly as a barometer.

When they remain naturally closed there is reason to fear a storm, high winds, and a troubled sea; but a fair and calm season is to be anticipated when they lie relaxed with spread-out tentacula. The observations of Dicquemare are the foundation for these conclusions, which are as follows:—

"My very earliest observation showed that the sea anemones feel and prognosticate, within doors, the different changes of temperature in the atmosphere. I had not leisure at that time to form tables of their various indications, but I have since done it. This fact, if applied to practice, might be of use in the formation of a sea barometer—an object of no small importance, which several ingenious men have hitherto endeavoured in vain to furnish us with.

"If my anemones be at any time shut or contracted, I have reason to apprehend an approaching storm—that is, high winds and an agitated sea. When they are all shut, but not remarkably contracted, they forebode a weather somewhat less boisterous, but still attended with gales and a rough sea. If they appear in the least open, or alternately and frequently opening and closing, they indicate a mean state of both winds and waves; when they are quite open I expect tolerably fine weather and a smooth sea; and lastly, when their bodies are considerably extended and their limbs divergent, they surely prognosticate fixed fair weather and a calm sea. There are times when some are open and others shut. The number must then be consulted—the question is decided by the majority. The anemones used as barometers should not be fed, for then the quantity of nourishment might influence their predictions."

The Extinction of the Mastodon.—Professor John Collett's Geological Report of Indiana for the year 1880 states that the mastodon was in existence in North America much more recently than is generally supposed. Thirty individual specimens have been discovered in Indiana, almost always in marshes, ponds, or other miry places, indicating at once the cause of the death of the animal and the preservation of the bones from decay. Spots of ground in this condition are found at the summit of the glacial drift or in old beds of rivers which have adopted a shorter route and lower level; consequently, their date does not reach beyond the most recent changes of the earth's surface. A skeleton has been discovered in excavating the bed of the canal a few miles north of Covington, Fountain county, in wet peat. The teeth are in good preservation, and it is stated that when the larger bones were cut open the marrow, still preserved, was utilised by the bog-cutters to grease their boots, and that pieces of sperm-like substance, 2½ in. to 3 in. in diameter (*adipocere*) occupied the place of the kidney fat of the monster. During the summer of 1880, an almost complete skeleton of a mastodon was found six miles north-west from Hoopston, Iroquois county, Illinois, which practically settles the question not only that it was a recent animal, but that it survived until the life and vegetation of to-day prevailed. The tusks formed each a full quarter of a circle, were 9 ft. long, 22 in. in circumference at the base, and in their water-soaked condition, weighed 175 lb. In the same bed of miry clay, a multitude of molluscs was collected. These molluscs prevail all over the States of Illinois and Indiana, and parts of Michigan, and show conclusively, says Professor Collett, that the animal and vegetable life, and consequently climate, are the same now as when this mastodon sank in his grave of mire and clay.

THE OCCUPATIONS OF THE PEOPLE

IN ENGLAND AND WALES IN 1881.

(From the last Census.)

By Percy Russell.

BEARING in mind the many momentous problems before us political, social, and industrial, the third volume of the Census of England and Wales for 1881, relating, *inter alia*, to the occupations of the people, certainly possesses extraordinary interest, and necessarily throws considerable light on what may be called the discipline of the nation. To properly examine such an enormous mass of tabulated matter would be impracticable within reasonable limits of space; but I propose to extract a few salient results from these valuable returns, and contrast them with those of the 1871 Census.

It appears, then, that in 1881 the total population was 12,639,902 males, and 13,334,537 females, against 11,058,934 males and 11,653,332 in 1871. Taking the six great groups into which the nation is here divided, we find that whereas in 1871 the total population of 22,712,266 was divided thus:—Professional class, 684,102 (including 197,984 females); domestic class, 5,905,171 (including 5,660,443 females); commercial class, 815,424 (including 57,237 females); agricultural class, 1,657,138 (including 186,696 females); industrial class, 5,137,725 (including 1,521,998 females); and finally indefinite and non-productive class, 8,512,706 (including 4,028,974 females). The corresponding figures for 1881 are:—Professional class, 647,075 (including 196,120 females); domestic class, 1,803,810 (including 1,545,302 females); commercial class, 980,128 (including 19,467 females); agricultural class, 1,383,184 (including 64,840 females); industrial class, 6,373,367 (including 1,578,189 females); and indefinite and non-productive classes, 14,786,875 (including 9,930,619 females), and this with a total population of 25,974,439. It will be seen that the "professional class" is considerably reduced in numbers, no doubt owing to a very strict classification, although there is but a small difference in those of the females thus returned. The domestic class has evidently been differently compiled, wives and children being carried over to the sixth table of the present returns. The commercial class exhibits a marked increase from 815,424 to 980,128, but as the females are put at only 19,467, it may be supposed that a more rigorous interpretation has been put on the term than in 1871, when 57,237 females were returned under that head. The agricultural class, as everybody anticipated, shows an enormous reduction from 1,657,138 in 1871 to 1,383,184; while the industrial class has advanced from 5,137,725 in the former period to 6,373,367 in 1881. The difference in the returns under indefinite and unproductive indicates a change of classification, being 8,512,706 in 1871, against 14,786,875 in 1881. This and some other alterations, rendering precise comparative analyses of the two groups of statistics difficult and intricate, scarcely enhance the value for popular exposition of the new, and in other respects valuable and excellently-arranged, records.

Passing from the great classes to orders, it is noteworthy that whereas in 1871 the Government of the country absorbed the services of 106,286 persons, including 6,394 females, in 1881 the corresponding figures were 104,592, including 7,370 females, a reduction on the gross total, but a significant increase in the number of females. Defence in 1871 occupied 136,491 persons, against only

124,580 in 1881. Turning to the principal professions, the results are equally significant. Thus in 1871 the clerical profession numbered 44,562, against 51,120 in 1881; law, &c., 37,327, against 43,641; medical, 44,214, against 64,548; teachers, 127,140, against 171,831; scientific persons, 6,192, against 8,394; artists, 16,562, against 58,517; authors, editors, and journalists (males) 2,148, against 2,982; and females, 255 against 452. The increase in all these departments of intellectual culture is very noticeable, more particularly in reference to art, and shows conclusively what extraordinary advantages have been gained during the period by the people in respect to the agencies for their instruction, entertainment, and refinement. It is also obvious that women are now playing a very much more prominent part in the great works of the nation than at the former period of comparison. Thus, according to the census of 1881, while the number of male teachers was 39,738 that of female teachers was put at 94,241. In 1871, the corresponding figures were 19,378 and 38,774. A remarkable contrast.

In 1871 the number of commercial clerks was 89,630, whereas in 1881, the number is set down at 175,468, an increase evidently out of all proportion to that of the population during the period. At the former period the females returned as "clerks" were 1,412 strong; now, according to the late census, they number 5,989. Against this remarkable growth of the subordinate rank and file of the commercial class, we have to see the fact that whereas in 1871 the number of merchants was returned at 15,903, in 1881 these appear reduced to 10,308. Bankers, too, have fallen from 1,287 to 1,052, but, *per contra*, brokers' agents, &c., have increased from 22,776 to 30,697, and commercial travellers have augmented from 17,895 to 35,478.

The "General Labourers'" class has increased from 509,456 to 556,876. In the Returns for 1871 in the general summary, we have under the heading Persons of Rank and Property, 25,510 persons set down as answering in some way or other to the "upper ten." In the present tables under 24th section of Table 6, we find 4,856,256 persons returned as of property or rank, and including all children under five years of age. I fail entirely to see what is the use of such an item as this.

The section devoted to the Occupations and Country of Birth of Foreigners is not without interest. In the National and Local Government, East Indian and Colonial services, there are only 28 aliens, and of these 25 are natives of the German Empire. Among the clergy there is a more considerable foreign element. Taking the Established Church we find 4 Austrians, 4 Swiss, 18 Germans, 3 Italians, 2 Norwegians, 7 Russians, 3 Poles, 4 natives of Holland, and 5 of France. Of Roman Catholic Priests, 6 are Austrians, 8 Swiss, 105 Germans, 45 Italians, 2 Greeks, and, strange to say, 2 Turks; there were, too, 28 natives of Holland, 67 of Belgium, 119 of France, and 10 of Spain. Law does not favour foreigners much, there being only 32 among the whole body of barristers, solicitors, law clerks, &c., of alien birth, and of these 11 are Germans. In literature the foreign element is by no means strong. Of authors, editors, and journalists 6 are Austrians, 2 are Hungarians, 1 is a Swiss, 28 are Germans, 5 Italians, 1 is a Dane, 3 are Russians, 11 French, 10 Portuguese, 2 natives of Holland, 1 Pole, 1 Belgian, and 3 Greeks. Only 14 foreigners are returned as reporters. Of painters, 15 are Austrians, 2 Hungarians, 4 Swiss, 98 Germans, 42 Italians, 2 Greeks, 7 Danes, 4 Swedes, 8 Russians, 4 Poles, 35 Belgians, 111 French, 6 Spaniards, 16 natives of Holland, 1 Norwegian, 1 Portugese, and, curiously again, 1 is a Turk. Only 13 aliens are returned as architects, and that out of a total of 6,898. Musicians, as may be imagined, furnished one of the largest contingents; they are as follows:—Natives of Austria, 25 males, 6 females; Hungary, 6 males, 1 female; Switzerland, 17 males, 8 females; Germany, 786 males, 94 females; Italy, 1,017 males, 223 females; Greece, 2 females; then there were 5 Danes, 2 females; 4 Norwegians; 6 Swedes, 5 females; 7 Russians, 5 females; 8 Poles; 45 natives of Holland, 7 females; 40 Belgians, 11 females; 74 French, 44 females; 4 Spaniards; 1 Portuguese; and 1 Turk. Those who are now exercised in their minds regarding the status and prospect of our ordinary commercial clerks will be interested to have the precise statistics of the foreigners now competing in this over-crowded department of industry with "Our Boys." Turning to the table for 1881, it appears thence that of commercial clerks of alien birth Denmark sent us 101 and 2 females; Norway, 77; Sweden, 100; Russia, 56, and, singularly enough, 1 female; Poland, 21; Holland, 137, and 2 females; Belgium, 78, and 4 females; France, 351, and 9 females; Portugal, 25; Spain, 65; Italy, 88, and 1 female; Greece, 42, and 1 female; Turkey, 33—it will be noticed that the Turk is remarkably represented in the industries of this country; Roumania, 3; and last, and most formidable of all, Germany sends us 1,781 males and 14 females in this capacity. In 1871 Germany sent us 1,257, the total then of foreigners employed in England and Wales as clerks being, all told, only 2,498.

A patient search will, of course, unearth many curiosities of the Census. Thus, in the returns devoted to the blind it is somewhat surprising to find that the number of the blind has risen from 21,590 in 1870, to 22,832 in 1882. Blindness appears to prevail chiefly among musicians (males 496, females 70); agricultural labourers, &c. (males, 574, females, 21); matmakers (males 158, females 5); and carpenters (males 120). Touching deaf and dumb persons, four are in the Civil Service, three as messengers; one is a soldier, and, most strange of all, one is returned under the head Minister or Priest, and nine persons thus afflicted are recorded as Missionary Scripture Readers and Itinerant Preachers (!) As to lunatics, these have increased from 39,567 in 1871, to 51,786 in 1881. I might easily multiply examples of odd things from these voluminous returns, but those cited here may suffice, perhaps, to indicate the sterling value and interest possessed by this the third volume of the Census for 1881 regarded as a whole.

A HEAD, says the *Panama Star and Herald*, taken from a monolith at Tiahuanaco, has been erected in La Paz, Bolivia. Some time ago General Ballivian attempted to transport the monolith intact, but, after removing it some distance, the work was found to be difficult and the effort was given up. This stone is eight mètres in length. The head which has now been taken to La Paz weighs 2,700 lb. It must be remembered that the ruined city at Tiahuanaco is celebrated for the massive nature of the stones employed in the erection of its temples, fortresses, and houses. In one of the walls there is a gigantic mass of rock, which has been carefully measured and proved to weigh 250,000 lb., or 125 short tons. Who were the builders, and how they contrived to handle these enormous masses of rock remain enigmas to the present day, although fancy and tradition have been busily employed endeavouring to solve them. Tiahuanaco is situate in Bolivia on the south shore of Lake Titicaca.

XUM

TRICYCLES IN 1883.

By John Browning,
Chairman of the London Tricycle Club.

PROTECTING MACHINES FROM WEATHER, MENDING TYRES, AND RIDING IN WINTER.

THOSE tricyclists who do not ride during the winter should cover all the bright parts of their machines, whether plain steel or nickelised, with a good coating of vaseline, which can be applied best with a small hog-hair brush. This will be found a complete protection against any amount of damp, or even wet. No other material will bear comparison with it as a rust preventive.

Those who do ride occasionally should apply a small quantity of vaseline very thinly with a piece of rag. This will scarcely be seen, but it will serve a double purpose—it will protect the bright parts and prevent mud from adhering strongly, and thus facilitate their being cleaned. In my own case, I apply it to the painted parts of the machine and also to the leather satchels and straps, as it keeps them flexible and prevents them from cracking or becoming mildewed.

I must here express my regret at the number of tricyclists who ride only about six months in the year. Bicyclists are almost compelled to give up riding during the winter months, as they cannot steer their machines, which are always in a condition of unstable equilibrium when the wheels fall into ruts, or they come across loose stones, which, in these months, are so plentiful; nor can they altogether avoid most dangerous falls from their wheels slipping sideways upon frozen snow or ice.

But tricyclists can use their machines in any condition of the roads. A low gearing, from 36 in. to 46 in., according to the weight of the machine and the rider's strength, and a good-sized tyre—that is, from $\frac{3}{4}$ to $\frac{7}{8}$ of an inch diameter—will carry him through any mud and over any stones; though I should advise new stones being walked, not ridden, to save the rubber tyres.

When, however, the roads are frozen hard—the most difficult of all conditions for a bicyclist to ride—the tricycle rider may enjoy a pastime superior even to skating.

I shall never forget, one bright, frosty Christmas day, how I spent the afternoon on wheels with my two earliest and best friends in the wheel-world; how we spun along over the frozen ground, hardly feeling the exertion; and now we finished our run by gliding down hill for between three and four miles with our feet up on the rests, at the rate of something very little less than twenty miles an hour. Nor shall I forget how the following year, with the same dear friends, I rode the old year out and the new year in on a clear moonlight night, through a landscape covered with snow. Still, it must be admitted that there are some days in our winter on which the most enthusiastic rider would scarcely be tempted to ride. Such days may be taken advantage of to mend the cuts in the rubber-tyres.

Mr. Bennett has recently shown me an excellent way of doing this. First, get some indiarubber solution, or cut up a piece of old tyre into fragments about half an inch square, and put them into a wide-mouth, glass-stoppered bottle, then pour in just sufficient turpentine to cover them; let the bottle stand until they swell, and then put it into a slow oven, where, in a short time, the turpentine and rubber-tyre will run into a jelly. Now, with a small piece of thin wood, in the form of a spatula, fill the ruts in the tyres with this jelly. Wait until the turpentine has evaporated, so that this cement becomes thick and strongly glutinous. Then insert a small wedge of old rubber tyre into the cut, and leave it until the cement is firmly set. When this is the case, the top of the wedge, which should project above the tyre, should be trimmed off with a sharp knife, kept wetted.

One gentleman informs me that he has had his rubber tyres badly gnawed by rats, and that he believes this arose through the oil-cups of the wheels having been allowed to hang downwards, so that the oil dripped on to the tyres, and softened the rubbers; and the rats were only tempted to gnaw these for the sake of the oil which had soaked into them.

In any case it would be well in leaving a machine to take care that the oil-cups are carefully turned upwards, as oil alone will completely destroy rubber by reducing it to a jelly.

At the urgent request of several correspondents, I shall shortly write an article, or articles, on "How to Choose a Tricycle."

A MARINE MONSTER.

By Richard A. Proctor.

THE discovery of a strange sea creature near St. Elmo, illustrates the truth of what I had remarked a few days earlier as to the smallness of our knowledge of the denizens of the mighty deep. The case is interesting not only in its bearing on the accounts of sea monsters of species as yet unknown, but also because it seems as though in the present case evidence of the existence of a tolerably numerous race of creatures had been obtained. To begin with, the account is not characterised by any evidence of an attempt to excite wonder by untruths. The animal seen, though unlike any known, would not be in itself very marvellous. Omitting details of no importance, the account runs thus:—While the boats of Capt. Seymour's barque, *Hope On*, were on the watch for whales off the Pearl Islands (between forty and fifty miles from Panama) the water broke a short distance away, and Capt. Seymour made ready for a whale. But a head like that of a horse rose from the water and then dived. The creature was seen by all the boat's crew. Capt. Seymour describes the animal as almost twenty feet in length, with a handsome horse-like head, with two unicorn-shaped horns protruding from it. The creature had four legs or double-jointed fins, a brownish hide, profusely speckled with large black spots, and a tail which appeared to be divided into parts. The creature was seen on two different days, and if whales had not been about at the time, an effort would have been made to catch it. Captain Seymour and his officers agree in considering that the creature is peculiar to the locality, and that it could easily be killed with lances and guns. It is important to notice that officers of the Pacific Mail Company state they have seen the animal on several occasions, but not so closely as did the officers and men of the *Hope On*.

The nearest account of any strange animal akin to that seen by Captain Seymour and his men, is the account of a marine creature, supposed to be a sea serpent, seen in 1817 near Cape Ann, Massachusetts. Eleven witnesses of good reputation gave on oath before magistrates—one of whom had himself seen what they had—a description of a creature like a serpent, dark brown in colour (some said mottled), with white under the head and neck. The head of this creature was as large as a horse's, but shaped like a serpent's; and the animal was estimated as exceeding 50 ft. in length. Colonel Perkins noticed an appearance in the front of the head like a single horn; but other observers thought this was the monster's tongue.

The evidence now obtained confirms the theory which was advanced in 1848 and has since been maintained by Gosse and others, that a race of marine animal exists, including probably several varieties, which is characterised by a serpentine neck, a head small compared with the body, but large compared with the thickness of the neck, an air-breather, and deriving its propulsive power from paddles—in other words, a modern representative of the long-necked plesiosaurians of the great secondary or mesozoic era. Creatures of this class have been aptly compared to what would be formed by drawing a serpent through the body of a sea-turtle. — *Newcastle Weekly Chronicle.*

THE AMATEUR ELECTRICIAN.

BATTERIES VI.

AN inexpensive, but at the same time efficient, form of bichromate battery may be constructed with but very little trouble. When a comparatively powerful current is required, it is generally speaking more advantageous to use a number of small plates, in preference to a pair of large ones. In Fig. 1 is illustrated a combination of five

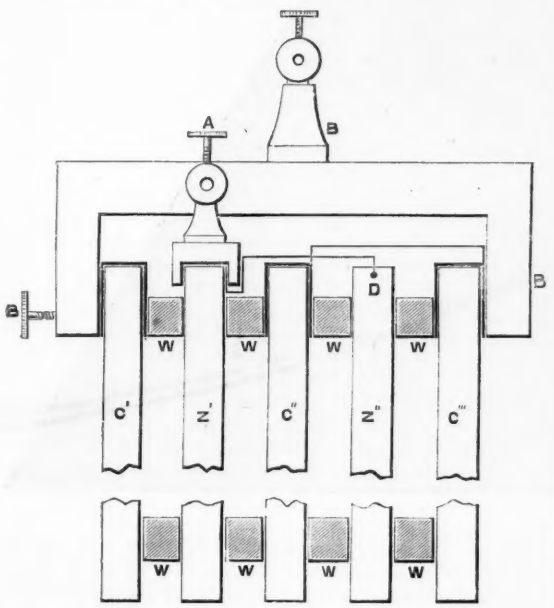


Fig. 1.

plates—two of zinc and three of carbon. The same general arrangement will do for any number of plates, providing that the number of carbons always exceeds that of the zincs by one. Six inches by three inches will be found a very convenient size for the plates, the zincs being a quarter of an inch thick. The thickness of the carbons is not very material, except for convenience' sake. They are, however, usually sold about a quarter of an inch thick. In fitting-up, the zincs and carbons should alternate, as shown in Fig. 1 (CZCZC), and should be separated at the bottom by strips of wood (WW) about three inches long and a quarter of an inch in section. The carbon plates should previously be capped by bending over the top of each carbon a strip of thin sheet lead. The lead answers the double purpose of keeping the solution from the upper portions of the cell, and of insuring good metallic connection. A small brass terminal or binding screw (A) should also be soldered or screwed on to one of the zinc plates (Z^{I}), and should embrace also the free end of a piece of copper wire, soldered (as at D) to the other zinc plate (Z^{II}). A stout brass clamp or binding screw (B) holds the arrangement together at the top, and connects the external carbons (C^{I} and C^{III}). The lower portions being kept in position by means of a stout india-rubber band (not shown in the diagram), a piece of copper wire, or a strip of thin sheet copper clamped at one end between the lead cap of the centre carbon (C^{II}) and a contiguous wooden rod (W), and at the other end between the terminal (B) and the lead cap of the external carbon (C^{III}) places C^{II} in electrical connection with the other carbon plates. A and B afford the requisite facilities for connecting the battery to the circuit through which the current is designed to travel. The series of plates may be placed in an earthenware or other non-porous vessel of suitable dimensions, say four inches in diameter and five and a-half inches deep.

For the solution, dissolve bichromate of potash in boiling water until the solution becomes a saturated one, and add to it about one-tenth the volume of sulphuric acid.

As the solution is a highly corrosive one, it is advisable to coat all exposed metallic surface with pitch, sealing-wax varnish,* or some other unassailable substance.

The plates should only be kept in the solution when a current is required, and some device for accomplishing this is necessary. With expensive forms, such as the bottle bichromate (see KNOWLEDGE, No. 105), this object is attained by supporting the zinc plates at the end of a long brass rod, which slides tightly in a vertical tube, a small nut being used to keep the rod in any desired position. The carbons in this case remain in the solution. Where there are several cells in use they are placed in a kind of box, and all the plates are attached to a rod which is raised by means of a strong cord controlled by a winding arrangement. An equally efficient device is to stand the cells on a board, carrying at each extremity an upright about twice the height of the cell, one of them being so shaped as to allow a rod, to which the plates are attached, to be lifted and lodged in grooves cut in the upper end of each upright. With a single cell, however, the best and cheapest plan is to use a second glazed earthenware jar, and after washing the plates (without taking the arrangement to pieces), place them in it, and let them remain there till the cell is again required.

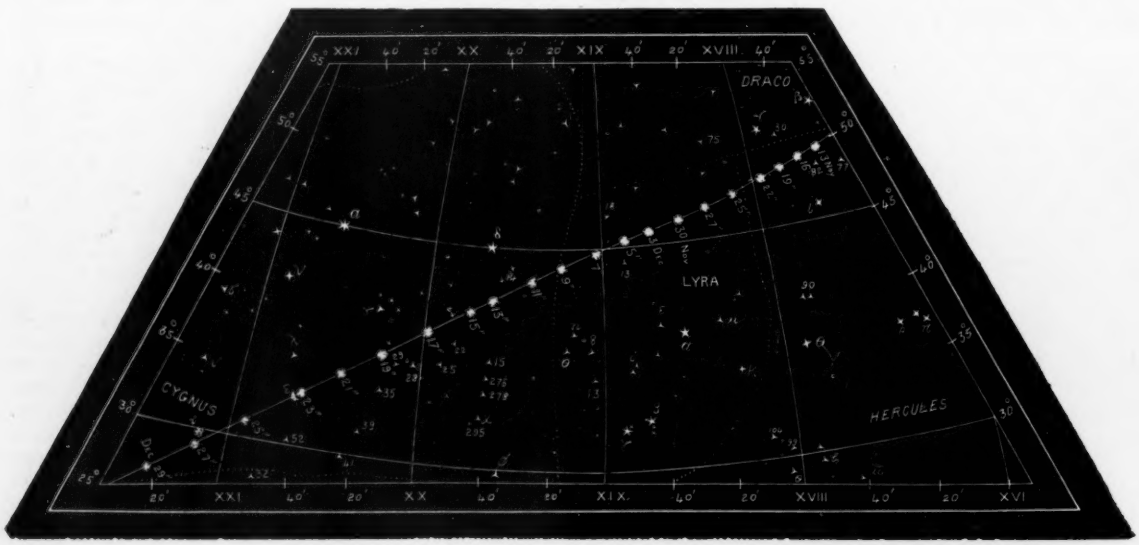
Double liquid bichromate cells are very numerous in form and constitution. The simplest is that in which a bichromate of potash solution replaces the nitric acid in the Bunsen cell. It is found to give good results, and we have used them at various times during the past ten or twelve years with great success. The cell yields a current almost equal to the Bunsen; it is more durable, more constant, more economical, and gives off a much smaller quantity of fumes, which are also of a less obnoxious nature. As a result of considerable experience, it is found that the depolarisation of the negative plate, or, in

* An extremely handy mixture, which may be prepared by dissolving good shelllac in methylated spirit, until the solution is of a consistency suitable for the particuiar purpose for which it may be made, and then adding a very small quantity of vermilion, sufficient only to give the desired tint. It is better to prepare the solution in this way than to use manufactured sealing-wax, which generally contains foreign ingredients of an injurious nature. The varnish must not be too thick, otherwise it will take an unnecessarily long time in drying. If too thin, there is a wasteful consumption of spirit. Experience will best indicate the most advantageous consistency. The varnish may be kept for a long time if well bottled.

simpler language, the combination of the nascent hydrogen with oxygen of the bichromate of potash, proceeds less rapidly than might be desired. The result is that the constancy of the cell is materially impaired. To overcome this difficulty several devices have been bronght forward. Amongst them is the pneumatic cell, in which air is forced into the cell at the bottom of the plates, and, rising through the solution, carries off the hydrogen as it collects on the carbon plates. This arrangement also serves to keep the solution in motion, constantly supplying fresh salt to the plates. The cell cannot, however, be regarded as a very practical one, and we shall soon consider others which achieve a similar object in a less troublesome manner.

PONS' COMET.

THE comet (Pons-Brooks) was observed by me in Liverpool, November 17, between 6 h. 15 m. and 7 h. p.m.; the right ascension being 17 h. 44 m. declination



north 49° 36′. It has greatly increased in brilliancy since October 3, shining as a star of the 7th magnitude; with a magnifying power of 30, a stellar point could be discerned, situated eccentrically within the elongated disc. It may be found with a field-glass, and is a comparatively easy object in a telescope of two inches aperture. The perihelion passage takes place on Jan. 14, 1884 (in right ascension 23 h. 12 m., declination south 1° 10′), at a distance of 53° from the sun. This comet, whose identity with that of 1812 has now been proved, was discovered by Pons, of Marseilles, on July 20, 1812, in the constellation Lynx. It shortly afterwards developed a tail 2° long, and was visible to the naked eye for ten weeks. The portion of the heavens represented in the map is taken from Proctor's "Star Atlas"; the path of the comet from November 13 to December 29 is projected from Chandler's corrected elements of Schulhoff and Bossert. On Jan. 30, 1884, it will be in Cetus, on February 13 in Sculptor, and after the latter date will be invisible in these latitudes, owing to its great southerly declination.

W. K. BRADGATE.

Reviews.

EVOLUTION AND NATURAL THEOLOGY.*

BY EDWARD CLODD.

THIS is a book of much interest from the pen of a ready writer. Mr. Kirby has already scored honours in the scientific world as an expert in entomology, and his experience in classification serves him in good stead in the arrangement of the mass of material, which, in a volume of about 200 pages, can be treated only in a summary fashion. Whilst, however, neglecting no important feature of the theory which he expounds, Mr. Kirby has shown literary skill in preventing his little book from becoming a mere catalogue. As will be seen presently, the space given to matters which are no essential part of the theory of evolution is to be regretted, because it might have been devoted with advantage to more detailed reasoning in support of that theory. From the like cause, the arguments in its favour furnished by philology and by the important transitional forms of organisms, are tantalisingly meagre, whilst the discussion upon Sir William Thomson's *bizarre* theory of the origin of life—namely, that if a mass of matter from an inhabited world fell upon an uninhabited world, the adhering germs would in time stock that world with life—could have been well spared. The work opens with a well-condensed sketch of ancient speculation concerning the earth and its place in the universe as contrasted with modern theories founded on observation and experiment, and in succeeding chapters the steps by which scientists of the eighteenth and nineteenth centuries have been led to substitute for the old theories of special creation and the fixity of species theories more tenable, which have finally culminated in the brilliant generalisations of Mr. Spencer and Mr. Darwin, are clearly laid down. Mr. Darwin's explanation of organic evolution is then passed in review, and the general body of evidence upon which it is based summarised, with the needful quali-

* "Evolution and Natural Theology." By W. F. Kirby, of the British Museum. (W. Swann, Sonneschein, & Co. 1883.)

fication that natural selection is probably not the only agent in causing variations of species.

No one can rise from the careful perusal of the first eleven chapters of this book without feeling that the author has succeeded in infusing into the mind of the reader a deeper consciousness of the unity which underlies the most varied phenomena, and in preparing him to accept the doctrines of the evolution of the organic from the inorganic "by the regular action of the unchangeable order of Nature," and of the probable ultimate homogeneity or sameness of the inorganic elements of which the visible universe is built up."

Thus far all is clear and self-consistent, but when, in his chapter on the "Course of Development on the Earth," Mr. Kirby plunges us into theories of intermediate spirits "guiding the operation of the ordinary laws of Nature,"* of the pre-existence and successive metamorphoses of disembodied spirits, to the existence of which all ages, he remarks, have furnished "a vast amount of testimony";† of the immortality of brutes and plants; we are no longer on the solid, but caught up into a sphere where we hear language untranslatable. From the title of the book itself, as from remarks scattered throughout, we gather that the complexion of the author's mind is towards the high matters just named; that, in fact, they are the chief occasion of his work being written, and the importance of deciding on their admission or dismission must justify reference to them in this notice.

Whilst in the earlier part of his book Mr. Kirby admits that man is no exception to the common structural type, in the chapter under review he contends for an exceptional mode of development.

> Wallace, in his essay on the Limits of Natural Selection, as applied to man, argues that we may trace in Nature, and especially in the origin of man, the action of intelligences controlling the action of natural law for definite ends. . . . Any beings which may be supposed to exist, must necessarily exist only by the will of God, and must exist through, and subject to, the limitations of the laws of Nature, or, to speak more correctly, the will of God, as man himself. . . . Man possesses considerable power over the lower animals and over his fellow men; and there is, therefore, nothing unreasonable in Wallace's view that other beings may have power over the development of man, especially when we consider that it cannot be satisfactorily accounted for by the operation of those ordinary physical agencies which are frequently spoken of as the blind forces of Nature.‡

We promise Mr. Kirby not thus to speak of them, our feeling of the immanent life in the universe being as deep as his own, although not quickened by such imaginings. But in the above quotation we see the effects of what Mr. Spencer calls the "theological bias," which, whether it be born of the intuitional philosophy or of the doctrines of Swedenborg or Rome, refuses to apply the theory of evolution to the complete nature of man, speaks of laws of Nature as entities, and of matter as if its ultimate nature was proven to be the opposite of spirit. Either man is a part of nature, or he is not; if he is, then the theory of evolution must embrace the genesis and development of mind with all that it involves; if he is not, then let us not coquet with an illusion, but return to our first love, to belief in Adam, as the father of us all, created of dust, and made a living soul by the breath of a Personal God. Between these two positions there is no room for the hypothesis of intermediate intelligences, and the evolutionist and the believer in special creation will alike resent them as an intrusion and an impertinence. Those who, whilst professedly following the scientific method, assume their existence, ignore that principle which Sir William Hamilton calls the Law of Parsimony, which forbids us to invoke the operation of higher causes when lower causes are found sufficient to explain the effects. Such chimeras remind us of Emerson's remarks on the three heavens and the three orders of angels of Swedenborg. "His spiritual world bears the same relation to the generosities and joys of truth of which human souls have already made us cognisant, as a man's bad dreams bear to his ideal life."

The causes of that reluctance to follow the theory of Evolution to its obvious and ultimate conclusions which this book illustrates are, as hinted above, twofold.

1. Presuming on an isolated supremacy in creation fostered by traditional beliefs, man tardily applied to his kind the investigation long extended to every creature beneath him, and the like pride of birth has hindered the admission of lineal connection between the beliefs of cultured races and those of savages. That in savage philosophy is the germ of the highest metaphysic and theology was a thing undreamt of; and the beliefs which antiquity transmitted were too much wrapped up with man's dearest hopes and desires to allure him into inquiry as to their origin and growth. Whilst the theistic philosopher, confronted by theories of automatism, frames his conception of an ego as an entity not depending for its existence on any play of physical or vital forces, the Romanist biologist argues that "whilst man's body was derived from pre-existing material, his soul was created by the direct action of the Almighty." These, with all other kindred theories of man as dual or tripartite, are but the other self of primitive thinking "writ large." 'Tis a difference of words, not of things. Banish the terms, and in their thought the lower and higher culture have met together, the fetichist and the spiritualist have kissed each other.

2. In that assumed antagonism between matter and spirit which is a legacy from the past. If when we use these terms—if when we talk of matter, of mind, of motion, of force—we employed them only as the *x's* and *y's* of the mathematician, as convenient symbols of that which cannot be known, this bugbear of materialism which drives men into opposite camps would disappear. Our only escape from it is in accepting that philosophy of idealism which supposes that our "knowledge of matter is restricted to those feelings of which we assume it to be the cause," and that, whatever it may appear to us, it is probably something altogether different. We shall not then speak of "laws of Nature" as entities, or, because a convenient name has been given to certain classes of phenomena, suppose that the name is the thing, or the cause of the effect observed.

To sum up. As a lucid exposition of a theory which nourishes the intellect and enthralls the imagination, this book is to be commended; as an attempt to engraft the spiritualist hypothesis, for such it really is, upon that theory, the book is to be condemned. Nor would its later chapters have been criticised here did they not represent a literature which is the outcome of minds profoundly affected by the results of modern research, and prepared to abandon many a cherished belief, but to whom the words addressed to the wealthy ruler apply, "One thing thou lackest."

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* Page 155. † Ibid., p. 155. ‡ Ibid., pp. 140, 142.

Note.—In any future edition of his book Mr. Kirby should correct the popular but incorrect meaning of Nirvāna to which he gives currency. It is, according to Dr. Rhys Davids, neither a place of celestial repose, nor annihilation, but "the extinction of that sinful grasping condition of mind and heart, which would otherwise according to the great mystery of Karma, be the cause of renewe individual existence."—Rhys Davids's "Buddhism," pp. 111, 112.

XUM

A CHALLENGE FROM THE EARTH-FLATTENING SOCIETY.

By Richard A. Proctor.

BECAUSE I have just finished a series of papers giving some illustrations of the earth's rotundity, I have been invited by a Society called the Zetetic Society to discuss with Parallax the question whether the earth is flat or round. The invitation has been gravely presented to me, despite my oft-repeated statement that there is no such question for me or for any one who, having learned what are the known facts, has average power of reasoning about them. But I have no doubt my declining to accept this invitation, courteously enough advanced, will be described (if not actually regarded) by the Zetetists as evidence of weakness in the theory of the earth's rotundity. I am not greatly concerned on this point. I am amused, however, at the quaint reasoning of Parallax himself on a personal question. It is known that speaking of the book which he published somewhere about the year 1864 (it was then at least I first saw it, but it may really be older), I have expressed my doubts whether he is really sincere, however earnest his followers may be, in denying the earth's rotundity. He advances the singularly illogical objection that he has never questioned my sincerity and therefore I have no right to question his. As if, before one challenged what one believes to be false and wilfully false teaching, one were bound to wait till such a charge had been brought against oneself. Were a charge of insincerity brought against me, and based (as of course, to make it worth noticing at all, it must be based) on some acknowledged statements of mine, I should be prepared to answer the charge. That none such has been made by Parallax is *primâ facie* evidence that he knows of nothing I have ever said which could so be challenged. Now my charge of insincerity against him is based on definite passages in his book, and has never been met, except by vague denial of insincerity. Thus he states that with his eye close to the water level (still water) he saw through a telescope the whole structure of a bridge over the water, down to the very water, six miles away: but he has invented a law of perspective (it has no existence in nature, but *that* is nothing) explaining (what he knows very well) the fact that one can never see what he described. He states that out of fifty trials in which he fired a gun tied vertically, the bullet *twice* came back into the very muzzle of the gun: if a man, shown otherwise to be of unexceptionable veracity, told me this, I should feel sure he mistook a dream for reality: if I seemed to see it myself I should *know* it was a dream. He introduces quotations which seem to support his doctrine of a flat earth, but in every case a reference to the original shows that he stopped short at the very point where words were coming which would have been made the passage bear quite the other way. He quotes from an old number of the *Times* a passage in which the North Star is described as seen from a certain ship in latitude 23°, in such a way as to suggest the idea that this was south latitude. On turning to the passage I found that from the date of sailing and arrival of the ship it was clear (and must have been clear to him) that the ship was in north latitude. He refers to the motion of a bottle carried by currents through some 240° of longitude in the southern seas in such a way as to convey the idea that the bottle had gone the short way round, though on referring to the passage cited (in Captain Ross's book on the Antarctic Seas) it appears that he could not possibly have mistaken Captain Ross's clear statement that the bottle was carried the long way round. He speaks of latitudes in North Zealand in terms implying that they are much the same as latitudes in England, only southern instead of northern, though he cannot but be aware that they are very different. Lastly (to pass over a dozen or so of kindred cases) he has ever shown himself unwilling to touch on the obviously fatal objections to his theory (two or three of which I shall presently mention) though ready to discuss at any length those points in which he knew there was no particular difficulty.

From this evidence I deduced the conclusion that as Parallax is manifestly not wanting in intelligence or even in ability, he advocates a theory which he knows to be erroneous; for no intelligent person will bolster up a sound theory by false experiments, garbled extracts, and untrue statements, or be unwilling to examine into all such difficulties as even true theories commonly present.

And now, if it will be any comfort to the Zetetic Society or to believers in Parallax's theory of a flat earth or any modification of it yet presented to an amused world, I announce myself as perfectly ready to discuss the matter whensoever any member of the Zetetic school—

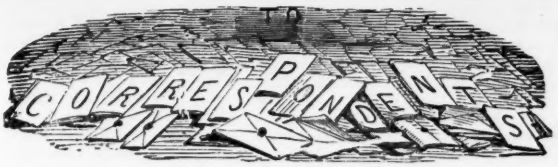
(1.) Has shown why, despite the enormously varying distance of the sun (while yet it is day) according to their theory, the sun does not vary correspondingly in apparent size.

(2.) Has explained why though according to their theory the sun never passes to such positions as to lie towards the south of east and west in New Zealand, Victoria, or Tasmania, he is seen, in summer mornings and evenings, far to the south of east and west.

(3.) Has shown why at the equator in spring and autumn the sun rises due east and sets due west, though according to their chart and account, it is really due north-east and due north-west at six a.m. and six p.m. respectively at the equator in spring and autumn.

And (4.) has assigned any possible positions to, say, the seven chief stars of Orion, consistent with the circumstance that these stars present precisely the same configuration when seen overhead at the equator, or low down towards the south from high northern latitudes, or low down towards the north from high southern latitudes, the last view showing the giant inverted, but the configuration of the star-group absolutely unaltered.

In order to ascertain to what extent aniline colours might be injurious to health, notice was, for some years, taken of the health of the *employés* of the aniline colour works at Höchst-on-the-Main, where 672 persons are employed. Reporting the result, the *Journal of Gas Lighting* says that it is known that nitro-benzol is poisonous, yet among the 24 men employed at Höchst, in the nitro-benzol house, during the last four years, symptoms of "nitro-benzolismus" appeared in only five cases. Aniline, also, is admittedly poisonous; and of the 29 men employed in the aniline house at Höchst there were 18 cases of specific aniline poisoning, none of which proved fatal. The workmen in the magenta house were always reddened with dye, even to the inside of the mouth, and some of the material must therefore have been swallowed; yet not a single case of specific ailment has occurred among them for eighteen years. Neither magenta nor its derivatives, when made without arsenic, can be considered in the least degree harmful. Naphthaline is observed to be deleterious only when in the form of hot vapour. On the whole, Dr. Grandhomme finds that the average mortality of the work-people was 4·2 per cent., which is a distinctly favourable result, and should go far to dispel any lingering dread of coal-tar colours, on the ground of their containing poison.



"Let Knowledge grow from more to more."—ALFRED TENNYSON.

Only a small proportion of Letters received can possibly be inserted. Correspondents must not be offended, therefore, should their letters not appear.

All Editorial communications should be addressed to the EDITOR OF KNOWLEDGE; *all Business communications to the* PUBLISHERS, *at the Office, 74, Great Queen-street, W.C.* IF THIS IS NOT ATTENDED TO DELAYS ARISE FOR WHICH THE EDITOR IS NOT RESPONSIBLE.

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The Editor is not responsible for the opinions of correspondents.

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ORDNANCE MAP MEASUREMENTS.

[1025]—I see "E. H. O." is not a surveyor, but his letter opens up an interesting question.

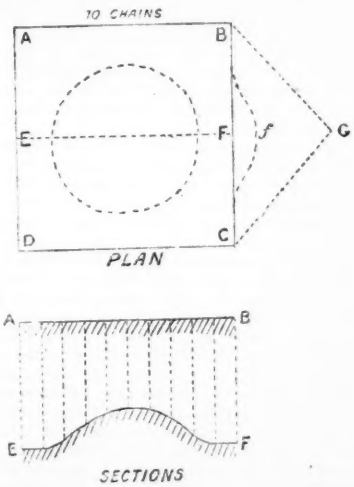
It is absolutely necessary in surveying hilly land to reduce all measurements to a horizontal datum. Land in such situations is always bought and sold in accordance with that rule. Thus, an acre of land on a hillside is really greater than an acre in the level, although the additional yards it may contain may be stated as the unavailable portion.

Let us briefly consider a case.

"E. H. O." buys a level field surrounded by a fence in the shape of a perfect square whose side is 10 chains. The area of the field is 10 acres. Through a convulsion of nature a large mound is thrown up in the centre, two or three hundred feet in height, leaving the fences undisturbed.

The area of the surface now contained is obviously greater than before, although a surveyor would take no notice of this fact, but would make the area 10 acres, as originally.

The necessity for adopting this system of surveying will be seen on considering the diagram.



A B C D is a square whose side is 10 chains in length; the mound is shown by dotted lines in the centre. On measuring the line E F along the surface of the ground its length is found to be greater than 10 chains, and this length set off from E would extend to F, distorting the fence which we know has not changed its position, and bringing it nearer the point G, which we also know is not the case. The necessity for reducing the measurements to a horizontal datum is at once seen.

I have stated that the additional area enclosed is unavailable; if we examine the sections A B, E F this is obvious. "E. H. O." cannot put up more houses, cannot grow more trees, nay, he cannot get more corn off his field with the additional superficial area, than he could when his field was flat. He would not care to pay for having the luxury of the hypotenuse of a triangle under his drawing-room floor instead of a level line, neither would he thank any one for the present of a few acres on the face of a cliff. The ordnance survey is quite right; the surveyors do, as the astronomers do, take the mean circumference of the earth. Astronomers do not take the measurements of the circumference of the earth, up and down the mountain sides. The levels and contour lines on the plans show the hills. CHALK.

POSTAGE STAMP FORGERIES.

[1026]—I am enabled to inform you that, in consequence of the action of the press, combined with the refusal of the person referred to in the following letter to deal with forged stamps in any way, and the subjoined note from myself to the Postmaster-General, the postal authorities have put in motion the Act of Parliament of 1840, whereby the possession of, or attempt to sell or dispose, by any means, of any forged stamp, or representation of a stamp, or the means for producing a forged stamp, is constituted a felony, the penalty for which is five to twenty years' penal servitude.

Philatelists may now congratulate themselves upon being protected from being duped by "facsimiles" or "copies"—which simply mean forgeries—of stamps of any description. They have the simple, immediate remedy of communicating the brief facts of their case, postage free, to "the Secretary's Office, Post-office, London," in the event of any sale, or offer of sale of any kind of forged stamp. NEMESIS.

[Copy of letter referred to above.]

To the Right. Hon. H. FAWCETT, M.P. Nov. 2, 1883.

SIR,—I have the honour to enclose for your inspection a forged postage stamp which has been offered for sale as being a genuine "Hong Kong" 16 c. stamp. As there are thousands of persons who would be glad to purchase this stamp, believing it to be a genuine British Colonial stamp, especially as it purports to be authenticated by the Post-Office obliterating stamp, may I ask if you, as the head of the postal system, are disposed to afford any official aid to prevent the sale of these forgeries? and thereby guard thousands of intelligent young collectors of stamps from further fraud and imposition. As some evidence of the extent of this trade in postal and fiscal forgeries, I can inform you that one dealer in stamps alone* has now in his possession above 10,000 forged stamps, chiefly British, many bearing the official post-mark. These forgeries have been collected at great cost, and to give some idea of this cost, if these forgeries were again to be sold to stamp purchasers they would readily sell for at least £1,500!—a large sum for the public to be victimised out of.—Respectfully waiting the honour of your early reply, &c.,

NEMESIS.

A STRANGE PHENOMENON—JUPITER'S SATELLITES.

[1027]—The letter (1019) of "Major ab Adversis," on p. 322, suggests to me to say that I myself received yesterday a letter dated October 31, from Kamptee, in the Madras Presidency, from which I extract the following:—"Extraordinary after-glow very nearly every evening. After sunset and after the sky got dark, it gradually reassumes the most brilliant roseate hues, which last some time. Also sun used to be *green* in the morning. Natives say sickness, famine, end of the world, and all sorts of things. Have you had anything like it?" Now, it is just because we have had something like this abnormal after-glow—in fact, the identical phenomenon—here in Sussex within the last two or three weeks that I trouble you with this communication. I first saw it after sunset on the night of November 8, when it assumed the appearance of an auroral glow over that part of the horizon below which the sun must have been situated. Its brilliance was so remarkable that a friend (Dr. Trentler, of Fletching), who had been with me in my observatory, and had left, returned on purpose to invite my attention to what he (a skilled meteorologist) regarded as a beautiful display of the Aurora. The whole of the western sky was ablaze with the most vivid crimson glow; albeit the sun had set for more than an hour and a half. A repetition of this striking phenomenon on the succeeding evening (the 9th) enabled me, however, to trace it definitely to the sun. I have not seen it since.

It needs a certain amount of temerity to differ with any one possessing such intimate familiarity with astronomical facts as the Editor of KNOWLEDGE; but I would venture to remark, in connection with his footnote to Letter 1024 (p. 323), that, while fully agreeing with him as to the instability of Jupiter's apparent surface, I do not think that we need go beyond the inaccuracy of

* We have omitted the name for sufficient reasons.

Damoiseau's "Tables of Jupiter's Satellites" for an explanation of the discordance between the predicted and observed times of their phenomena. Since the publication of those tables—forty-seven years ago—ample materials have accumulated for the calculation of fresh ones, if the Government would only find the comparatively small sum needful for that purpose. They might begin by granting the amount annually wasted on the wretched little quack "Committee on Solar Physics," at South Kensington, for this audable purpose. WILLIAM NOBLE.

Forest Lodge, Maresfield, Uckfield, Nov. 23, 1883.

"STRANGE PHENOMENON."

[1028]—In your issue of Nov. 23rd, I notice "Major ab Adversis" gives an extract from a private letter dated Kurrachee, Oct. 14th, concerning a brilliant glow after sunset. Perhaps in connection with this the following, received by the last Cape Mail from a friend residing in the Karoo district, near Graaff Reinet, may also be of interest to your readers.

"Oct. 21st.—Many of us out here are much interested in a very peculiar light visible in the west nearly every evening about an hour after sunset. It lasts until quite dusk, and throws a sort of lurid glare over everything, and the sky is angrily red. I have not seen anything about it in the papers, but the people were very full of it in Graaff Reinet. It is now about a month since we first noticed it." M. CAREY-HOBSON.

BIRTH AND GROWTH OF MYTH.

[1029]—In Vol. IV., No. 103, of KNOWLEDGE, Mr. E. Clodd, in his seventeenth paper on this subject, quotes the tale of Llewellyn and his faithful hound Gellert, which he classes as a fabulous legend; though, if we may believe an anecdote related by Ferishta, the Persian historian, who lived in the sixteenth and seventeenth centuries, and chronicled the events of the reign of Akbar, "the greatest of the great Moguls" (who died in 1605, and of some of his successors) it had its counterpart in Asia in those times.

In Ferishta's work, translated into English by Dow about a century ago, we find an account of the early life and adventures of Nur Mehal, who became the wife of Akbar's son Jehangir, and was the aunt of Mumtaz Mehal, to whose memory the Taj at Agra was afterwards erected by her husband, Shah Jehan, the son of Jehangir.

The tale runs as follows:—Chiaja Aiass, the father of Nur Mehal, was a native of Western Tartary, who belonged to a noble family fallen into decay. He and his wife agreed to seek their fortune in India, they having relations high in power at Akbar's Court; their whole wealth when they started appears to have been a sorry steed, on which the wife rode, as she was not in a state to endure fatigue. During their journey they were forced to subsist on charity; and after a time, to complete their distress, a daughter was born to them. The mother was very weak, and the father much exhausted with privations, consequently they saw no alternative but to expose their infant on the highway and leave it; they therefore placed her beneath a tree and went on their way. But after they had proceeded a short distance, the mother's heart pined for her child; she could no longer contain herself, and wept bitterly at the thought that she had been so cruel as to forsake it. Chiaja Aiass on this returned to the spot where they had left the baby, with the intention of restoring the infant to its mother, and, as the story goes, he found a black snake had coiled itself round the child, and on his calling out, the animal glided away; that he took up the child, which was unharmed, and that the family then proceeded by slow marches to Lahore, where Akbar at that time was holding his Court." Can this tale have been the foundation of the story of Llewellyn and Gellert? and the latter be but the European version of an incident which occurred in the East? COSMOPOLITAN.

[PROBLEM.—To find in the above story the hound Gellert.—R. P.]

WEATHER FORECASTS.

[1030]—I am very far from wishing to anticipate anything that Mr. Browning may have to tell us when he resumes the papers on weather forecasts begun in your number of KNOWLEDGE of October 12, but there is one point I should like to bring under the notice of your readers, who may be interested in this use of the spectroscope and are, like myself, observers—and the sooner this is done, I think, the better. My question is whether we cannot agree upon some general method of observation.

There are many conditions to be noted, and many things to be duly weighed and considered, in arriving at the mental comparison to be made by numbers ranging up to 5, as suggested in Mr. Rand-Capron's pamphlet.

I myself have drawn up, and am using daily, a form which contains no less than twelve columns, of which I send you a copy, and possibly there may be other things of importance which I have omitted.

At first this may seem complicated, but I am convinced that every one of these columns is of importance, the variations shown are very curious and interesting, and although I am, as yet, unable to correctly interpret their meaning in every case, still I find them often very helpful and suggestive. I can note them all now with ease and rapidity, and I do not find that the whole observation is appreciably lengthened by giving attention to their several points.

I should be very glad to hear what others are doing, and under what form they are recording their observations.

Although I make my observations at 9 a.m. daily, I am convinced that one observation a day is not nearly sufficient, and that the spectroscope may be used many times a day with advantage, the changes in the relative values of the columns being often very rapid, and the instrument quite as susceptible of recording passing atmospheric conditions as the aneroid barometer.

JOHN T. HARDING.

P.S.—On Friday, November 9, I noted an extremely sharp and well defined fine line, a little to the right (*i.e.*, towards the blue end) of the D lines. I have failed to exactly identify it. I wonder whether any other observers also noted it on that day. I have looked for it since and failed to discover it, at all events in anything like the intensity it showed on that day, although in other respects, the spectrum has been much the same.

Date.	Rainband Lines. 0. 1. 2.	Rainband shading. 0. 1. 2. 3.	Extent in height. 0. 1. 2. 3. 4.	Spectrum generally, whether Clear, Moderate, or Faint.	Earth Bands, Ditto.	Other Lines, if any remarkably Prominent.	Sky, whether Clear, Broken, Overcast, or Rain.	Total Value of the Observations. 0. 1. 2. 3. 4. 5.	Rainfall.	Whether the Forecast was True.	Approximately True, or False.

STORM GLASS.

[1031]—E. Brown (No. 1013) does not hit the point of the inquiry which was made recently in your useful journal. The storm glass asked about was a chemical one, such as are to be found attached to the Fitzroy barometer.

I have not the number of KNOWLEDGE by me which contains the query, but I noted at the time that the materials were the same as I used above twenty years ago with success. But they require careful manipulation, or they will not succeed, as the querist found. I have made several recently in two-ounce bottles. Some succeed, others do not.

I have had most success when I have used distilled water for the two salts, and used a less quantity of water than was mentioned by the querist. Then carefully pour in the solution of camphor, and cork. Let the bottle remain still to allow a slow combination, and the result ought to be that the salts are thrown down and the clear solution floats over them. If the upper portion remains clear it betokens fine weather. If crystals sprout up into the clear it betokens, with a falling barometer, rain or snow, or with a high barometer, wind and storm. Such, at least, is the result of my observation as to the barometer recommended by E. Brown. I have had one in use for years, but it requires fresh water occasionally to make up for evaporation. I also put some water into the Florence flask before inverting it in the pickle-jar, which, of course, must have less water in than E. Brown directs. But this is not a storm glass properly so called, but rather a makeshift barometer, and on the same principles.

I cannot explain the action of the true storm glass, unless on the supposition of magnetism, as it is carefully exempted from atmospheric pressure. H.

Pershore.

P.S.—On referring again to "E. Brown's" communication, I note that he recommends the oil-flask to be surrounded by a piece of cork so as to be air-tight. If so, how could the atmospheric pressure force up water into the flask? He ought to have said, Place

two or three pieces of cork between the neck of the pickle-bottle and the flask, so as to allow the air to pass freely. If this be not minded the water will keep its old level always.

LARGE *v.* SMALL WHEELS.

[1032]—In letter 985, p. 277, a correspondent (W. W. D.) states that diminishing the diameter of the wheels, supposing the height to remain the same, will increase the liability of the tricycle to overturn. Surely this is a mistake. The liability to overturn depends (if the height of the seat remain constant) not on the height of the wheels, but on the distance between them.

A. M. B.

DULL HEARING AND THE MICROPHONE.

[1033]—Is there any adaptation of the microphone or other instrument which will gather and convey sound to persons slightly dull of hearing, for use at public lectures, or meetings, and in the social or family circle, but not in the nature of ear-trumpets or tubes with mouth and ear-pieces of large size, and which are dangerous if used in a crowd?

If a sound receiver, fixed say in the breast opening of the vest, could be connected with a microphone, the sound being increased in volume passing through, connecting again by wire or thin gutta-percha or indiarubber tubing, with one or both openings of the ear, this would be a boon to thousands who, from thickened drums, or displacement of the small bones of the inner ear, or other slight disarrangement, are just too dull of hearing to catch sounds uttered in ordinary conversational tone. If this is possible, a small saucer-shaped receiver might be placed on the chest, the microphone being in an inside coat-pocket, the connection from receiver to microphone passing through the arm-hole of vest, wire or tubing again connecting with the microphone, conveying the sound, increased in volume, to the ear. The connections could readily be run between the clothing, and passing between the neck-band of the shirt and a buttoned-on collar, be almost or quite out of sight. The sound conveyers to the ears could be easily kept in place by thin spring wire passing at the back of the head, as often used to secure spectacles.

Te Whiti, New Zealand.

LETTERS RECEIVED AND SHORT ANSWERS.

J. C. P. The "Universe of Stars" is a more scientific work than any of the others you name; "Other Worlds" the more complete of the rest,—which treat of general subjects. An *atmosphere* not necessary for light; rays falling on any substance make it visible.—F. S. L. Thanks for explanation; but fear readers would say they knew.—A. C. Rodgers. Nay, I simply defended Professor Fiske, Vega, and the rest from the tide of your contempt, and showed what might be said on their side,—I may say on our side. Or rather we are in the *midst*, not on either side: in the midst of darkness visible (symbolization, again, my dear sir). On one side are those who think they know what God is and wills, on the other side those who think and say they know that there is no God that is and wills; in the midst are they who feel there is a Power at the back of all we know, but do not pretend to know its nature, plans, or purposes. Your dogmatic denials are as outside our plan as dogmatic assertions of belief. For the rest you find indignation and wrath in sentences free from either. You had expressed contempt and rancour for us who take the middle track, but we had and have no rancour or contempt for you on one side, or for the other Gnostics who are over the way. We simply doubt whether you know all you think you know.—F. W. W. My *dear* sir, how could I possibly answer your question without considering first all discoveries made with the microscope (say ten thick vols. imp. 8vo), then all those made with the telescope (say same space), and then entering on a careful comparison—say ten vols. more, and three lifetimes. I would be glad to do this if I could spare the time and possessed the requisite skill; but as matters are I must decline. To fully deal with the use of the microscope to botanist (2 vols.) anatomist (3 vols.), and physiologist (3 vols.) would take less time and space; but even for that these columns are not quite large enough.—D. Alas yes, the man in the moon is inverted in the southern hemisphere; but *per contra* the telescope which inverts him here puts him right side up there.—J. K. F. Thanks.—Perturbed. You have no reason to be perturbed by Professor Cayley's address and the idea of a fourth dimension in space. Would the idea disturb you that as yet we cannot conceive the square root of a leg of mutton?—H. J. W. Do not know the names you mention; but know that very good instruments of moderate price often so procurable.—W. Fraser. Fear can give no satisfactory opinion about the suggested motive power of tricycles.—Thorough. I agree with you as to the desirability of stamping out inherited and inheritable tendencies to crime, if it could be done; but not by execution. Why not simply remove from their fellow-men?—More Light. I have no chance of investigating the system just now.—J. Edwards. Thanks; but meteor you saw not unusual, and your observation gives no evidence available for determining its real path in our air.—R. P. J. The subject of poker across fire was fully considered long ago. I can find no possible scientific reason for it; and it is well known it began by way of making the "sign of the Cross" over the fire. Sunlight seems so obviously to dull firelight that the mistake in that case is natural enough.—M. G. I do not myself think the sun will ever be an abode of life. Saturn very obviously visible to the naked eye just now near Aldebaran, — being brighter than that first magnitude star.—W. C. M. Thanks for clever and amusing lines. Would print them here if I dared. But a host of misunderstanding ones would fall on me forthwith.—H. B. Heath. If two persons leave Greenwich at noon exactly, on Monday, one east the other west, and travelling as quickly as thought reach longitude 180° from Greenwich, one can draw no distinction between the day for each. At noon in latitude 0°, Monday is just beginning at a point a hair's breadth west of longitude 180°, and just ending at a point a hair's breadth east of that longitude. But at that precise longitude you can say neither one thing nor the other. If a traveller having gone west in an instant to a point just short of 180° were then to take a step over that longitude, he would theoretically pass from the beginning of Monday to the end of Monday or the beginning of Tuesday, but a step back would take him to the beginning of Monday again. M'chester. I regret that I have no personal acquaintance with Dr. S.—R. A. Law. Thanks. The Boston yellow sun was commented on in these columns, I think.—W. H. Spencer. Thanks for picture showing seven sunspots visible March 30, 1870, to the naked eye (separately visible, if I understand you aright).—Merlin notes that two sunspots were visible to the naked eye on July 21 last.—H. K. Harris. The auroral gleam often extends as far as due west, and its centre is always considerably to the west of north.—C. H. J. We could not just now find room for the suggested botanical papers.—J. Dyer shows convincingly that the flat earth theory would necessitate two days and two nights, each about six hours long, in every twenty-four hours.—H. Rolfe. Certainly more people have died within the last 800 years than are living now.—H. C. Standage. Can recognise no such claim, the MS. having been sent unasked.—Albion. Laws of spelling inscrutable. As you say, why should some of those words be spelled with e, some without? They would all be spelled with e's if we had a constant rule.—C. A. Ede. Many thanks.—J. C. Kernshaw. Thanks, but that was not a lunar rainbow, though rainbow colours were shown. A lunar rainbow can no more encircle the moon, than an ordinary rainbow can encircle the sun.—Jas. Brown. The air too thin to be warmed appreciably.—H. Seward. The paragraph and paradox simple bosh, as you suggest.—Michael Murphy. Arrah, be aisy.

Our Whist Column.

By "Five of Clubs."

Whist Ending p. 311. Correct solutions of both 1 and 2 by J. H. D. L., K. R. M., Long Trump, Bumper, J. N. Harrogate, and M. Wilson. Solutions of 2 by C. N. W., No Whist Player, (Sad)! A. M. Chambers, R. Carthwaite, J. Hargrade, M. Pennington, Veritas, Crafty One, J. N. Mumbles, K. K., and L. J. N., correct.

Several correspondents answer 1, which is really the easier question, incorrectly, though solving 2 correctly. Of course, to win, *Z* must lead the long Spade; but if *A* trumps and *Y* overtrumps, or if *A* throws a Club and *Y* trumps, *A B* can win every trick if they play correctly. A. M. Chambers, M. Pennington, and others make *A* throw a Club, *Y* trumps and *B* overtrumps; then *B* leads a Club and *A*, winning the trick, leads a Club. This would be throwing the game away. If *A* lead a trump through *Y*'s minor tenace, *B* wins all the remaining tricks. *Y* can only win by throwing his Club to *Z*'s lead of the long Spade. He can only then be led through once, whereas for *A B* to win every trick *Y* must be led through twice, since he holds 2nd, 4th, and 6th best trumps.

Next week the game closing with this pretty position will be given in full.

J. W.—Yes: a player is entitled to look at the last trick at any time during the play of the current trick. The idea that he cannot do so until all four cards have been played, though sometimes suggested, is quite mistaken. The last trick is looked at (but by inattention of players only) to guide the play in the current trick: at least this is so in nine cases out of ten.

XUM

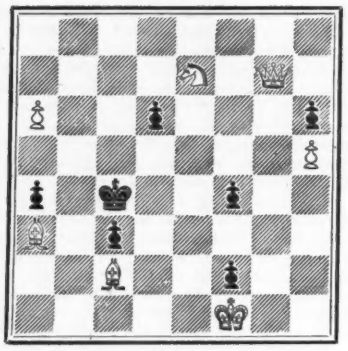
Our Chess Column.

By Mephisto.

PROBLEM No. 108.

By B. G. Laws.

Black.



White.

White to play and mate in three moves.

The following game, taken from the *Times Democrat*, was one of three games contested by Herr Zukertort, at New York, against Mr. Jas. McConnell, of New Orleans. The master won the remaining two games.

French Defence.

White. Zukertort.	Black. McConnell.	White. Zukertort.	Black. McConnell.
1. P to K4	P to K3	12. P to B4	Kt to QB3
2. P to Q4	P to Q4	13. R to Kt sq. (*c*)	B to B4
3. QKt to B3	B to Kt5 (*a*)	14. P takes P	Kt to KKt6
4. P takes P	B tks Kt (ch)	15. Q to Q sq.	Kt tks B (ch)
5. P takes B	P takes P	16. Q takes Kt	B takes R
6. Kt to B3	B to Kt5	17. P takes Kt	P takes P
7. B to K2	Kt to KB3	18. B to R3	R to K sq.
8. Castles (*b*)	Kt to K5	19. Q to B4	B to K5
9. Q to Q3	Castles	20. Kt to K5 (*d*)	R takes Kt
10. P to B4	P to QB3	21. P takes R	B to Q6
11. P takes P	P takes P	22. Q to B3	B takes R

And White resigned (*e*).

NOTES.

(*a*) All authorities agree in condemning this sally of the Bishop and the capture of the Knight. Mr. McConnell, however, prefers the text move to the usual 3. KKt to B3.

(*b*) 8. B to R3 looks plausible, and seems to hamper Black's movements considerably.

(*c*) A slip, of which Black takes full advantage.

(*d*) Unavailing.

(*e*) Black must now win another piece, *e.g.*, 23. K takes B, Q to Q8 (ch). 24. Q to K sq., Q to Q6 (ch), &c.

Correction.—In Problem 107, there should be a Black P on KKt2.

ANSWERS TO CORRESPONDENTS.

*** *Please address Chess Editor.*

W. T. Law.—Problems received with thanks. Will receive due attention.

Donna.—107 correctly solved, but please see correction above. You have the right first moves to 105 and 106.

Query.—Replied by post last week.

N. T. Angell *v.* G. Woodcock.

P. G. R.—See last week's number.

Clarence. — Highly flattered by your encouraging remarks. Problem 33, of Pearson's collection, cannot be solved by 1. Q to R6, Kt takes Q. 2. Kt takes Kt, as the R checks on K2; nor can you do No. 49 as proposed by 1. Kt to B3, B to Kt2. 2. Q takes B. After 2. P takes Kt there is no mate. You are right in 107.

A. Conrad Smart.—Notation indistinct. No. 106 after 1. P to B5. 2. Q to Kt8 (ch), K to B4. There is no mate if 3. Q takes P, Kt takes Q. No. 105, if 1. P takes Q. 2. P takes Kt (Q), R to B4, and again there is no mate.

Herbert W. Feather.—Problem received with thanks.

Correct Solutions Received.—Pearson's Problem, No. 33: G. Woodcock, H. A. N., Berrow. No. 49: G. Woodcock. No. 105: G. Woodcock, Rev. W. Anderson, H. A. N., Clarence, A. Schmucke, W., Berrow, S. B. B., Stettin, M. T. Hooton, G. Johnson, P. G. R., No. 106: Herbert W. Feather, John, W., Clarence, Rev. W. Anderson, H. A. N., G. Woodcock, M. T. Hooton, Stettin, P. G. R. No. 107: G. Woodcock, H. A. N., Rev. W. Anderson, Clarence, W., A. Schmucke, John, Herbert W. Feather, Berrow, S. B. B., Stetttin, M. T. Hooton.

For the guidance of correspondents we make known the following rules:—

1. In our replies we give the full and exact signature of a communication.
2. Correspondents may adopt any signature they please.
3. It is desirable that every communication should contain the name and address of the writer.

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See Advt. Pages for full Syllabus.

The following arrangements are complete: the numbers in brackets referring to above list.

MORNINGSIDE, Dec. 4 (4).
FALKIRK, Dec. 5 (6).
ALEXANDRIA, Dec. 6 (1).
CARLISLE, Nov. 30, Dec. 3 (2, 3).
ALTRINCHAM, Dec. 10 (3).
WOLVERHAMPTON, 11.
READING, Dec. 12, 14, 19 (1, 2, 3).
DORCHESTER, Dec. 18 (2).

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ROCHESTER, Jan. 21, 23, 25 (1, 2, 3).
GRAVESEND, Jan. 22, 24 (1, 2).
PERRY BAR, Jan. 29 (6).
KING'S HEATH, Jan. 30 (1).
BRISTOL (Colston Hall), Feb. 18, 22, 25, 28; March 3, 6 (the full course).
CHELTENHAM (Assembly Rooms), Feb. 5, 8, 12, 15 (1, 2, 4, 6). At 3 o'clock, Feb. 5 and 12 (3, 5).
BATH (Assembly Rooms). Four Morning Lectures at 3 o'clock, Feb. 6, 9, 13, 16 (1, 3, 4, 6); two Evening, Feb. 6, 13 (2, 5).
BIRKENHEAD, March 10.
ALTRINCHAM, March 11 (5).
CHESTER, March 12, 13 (1, 2).

Note.—*All communications respecting Lectures should be addressed to Mr. John Stuart, Royal Concert Hall, St. Leonards.*

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